TECHNICAL SPECIFICATIONS

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FWP# 7079154

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SECTION 01010 - SUMMARY OF WORK

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Owner and Contractor Responsibilities
- B. Contractor use of site and premises.
- C. Scope of Work

1.2 Owner and Contractor Responsibilities

- A. Owners Responsibilities:
 - 1. Provide staging area.
 - 2. Provide alternate parking so as not to encumber parking lot.

B. Contractors Responsibilities:

- 1. Furnish and Implement all work described in these documents.
- 2. Coordination with FWP Engineer Kenneth Phillips, P.E.
- 3. Any dewatering required for the work.

1.3 CONTRACTOR USE OF SITE

- A. Limit use of site to allow:
 - 1. Coordinate with FWP to limit access in work areas as necessary.
 - 2. Maintain construction site free of debris and stage materials in areas approved by FWP personnel.
 - 3. Contractor access limited to main parking area denoted on plans.
 - 4. Due to very limited parking, contractor is too limit vehicles on site to company owned vehicles only, no personal vehicles will be allowed.

1.3 SCOPE OF WORK

A. <u>Project Objective</u>:-

This project is to install a retaining wall system to help with snow removal and bank stabilization in front of the main parking area at the Region 6 HQ in Glasgow. This project will also install a metal stairway from the parking area to the alleyway north of the parking area.

B. Scope of Work:

Work includes the following but is not limited to the general description contained herein:

Remove existing railroad ties, cut back asphalt paving limited to area needed for placement of concrete footer. Install concrete footer, wall system, drainage system, segmented concrete wall and properly compacted backfill. Install metal stairway complete with concrete pads and anchorage. Re-grade and reclaim disturbed area and parking lot per plans.

C. <u>CONTRACTS</u>:

All work shall be done under one general contract.

SECTION 01019 - CONTRACT CONSIDERATIONS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Application for Payment
- B. Change procedures
- C. Environmental Considerations

1.2 RELATED SECTIONS

- A. Section 01025 Measurement and Payment.
- B. Section 01400 Quality Control

1.4 APPLICATIONS FOR PAYMENT

- A. Submit 1 copy of each application on Department Fish, Wildlife and Parks Form 101.
- B. Content and Format: Utilize Schedule of Values on proposal form for listing items in Application for Payment.
- C. Payment Period: 30 days.

1.5 CHANGE ORDER PROCEDURES

- A. The Engineer will advise of minor changes in the Work not involving an adjustment to Contract Sum/Price or Contract Time as authorized by State of Montana, General Conditions of the Contract.
- B. The Engineer may issue a Change Directive, which includes a detailed description of a proposed change with supplementary or revised Drawings and specifications, a change in Contract Time for executing the change. Contractor will prepare and submit an estimate within 5 days.
- C. The Contractor may propose changes by submitting a request for change to the Engineer describing the proposed change and its full effect on the Work. Include a statement describing the reason for the change, and the effect on the Contract Sum/Price and Contract Time with full documentation and a statement describing the effect on Work by separate or other contractors.
- D. Unit Price Change Order: For pre-determined unit prices and quantities, the Change Order will be executed on a fixed unit price basis. For unit costs or quantities of units, which are not pre-determined, execute Work under a Construction Change Directive. Changes in Contract Sum/Price or Contract Time will be computed as specified for Time and Material Change Order
 - 1.6 ENVIRONMENTAL CONSIDERATIONS
 All material removed from the site will be disposed of in a safe and legal manner.

END OF SECTION

Section 01019 - 1 Page

SECTION 01025 - MEASUREMENT AND PAYMENT

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Measurement and payment criteria applicable to the Work performed under a unit price payment method.
- B. Defect assessment and non-payment for rejected work.

1.2 AUTHORITY

- A. Measurement methods delineated in the individual specification sections are intended to complement the criteria of this section. In the event of conflict, the requirements of the individual specification section shall govern.
- B. Take all measurements and compute quantities. The Engineer will verify measurements and quantities.

1.3 UNIT QUANTITIES SPECIFIED

- A. Lump sum bid item quantities will not be measured. Payment for these lump sum bid items will be per bid form.
- B. If the actual Work requires more or fewer quantities than those quantities indicated, provide the required quantities at the unit sum/prices contracted if applicable.

1.4 MEASUREMENT OF QUANTITIES

- A. Measurement by Volume: Measured by cubic dimension using mean length, width and height or thickness.
- B. Stipulated Sum/Price Measurement: Items measured by weight, volume, area, or linear means or combination, as appropriate, as a completed item or unit of the Work.

1.5 PAYMENT

- A. Payment Includes: For each line item this includes all labor, equipment and materials required to complete the items. Some pay items will be interdependent on other quantities and many of the pay items will have incidental costs not refelected in the actual quantity but those incidental items should be included in the unit price and will not be paid separately.
 - 1. **Mobilization** this includes all general condition requirements such as insurance,

bonds as well as equipment and manpower mobilization to the site. It also includes any job trailer rental and other non line item specific materials or equipment. Mobilization cannot exceed 15% of the total bid and can be billed at 65% after move in and the remaining 35% after the project is completed and all equipment and materials are removed from the site.

- 2. **Demolition** includes all removal of existing retaining wall ties, timbers, anchors, and incidental items associated with the existing retaining wall. It also includes all sawcutting necessary and the removal and disposal of any asphalt and concrete. This will be a lump sum item.
- 3. **New Concrete Stem Wall** includes all excavation, grading, formwork, concrete, finishing and curing required for the complete concrete/footer system. It also includes all incidentals such as form ties typically used when constructing a concrete wall.
- 4. **Install Block & Geogrid Reinforcement**. Place per plans Allen Block. Owner will furnish 288 regular blocks and 60 radius blocks. Blocks needed over and above this amount shall be furnished by the contractor. This includes all cutting, placing, doweling and grouting. Contractor to furnish and install all geogrid reinforcement and incidentals required for the complete block system as shown on plans.
- 5. **Drain Gravel.** This item includes all drain gravel as well as all landscape fabric including the leveling course and backfill drain gravel as shown on plans.
- 6. **Install Cap**. This item includes all cutting, placing, of Allen Block cap as well as incidentals such as backer-rod and caulking used to seal the front lip in the sections that are directly placed on concrete stem wall. Owner will furnish 120 caps.
- 7. **Valley Gutter.** This item includes all excavation, leveling course, reinforcing, concrete as well as placing, finishing and curing to the lines and grades as shown for the valley gutter. It also includes any asphalt patching associated with this work.
- 8. **Terrace Drainage System.** This item includes all fitting, primers, glues as well as pipe grading and installation of the drainage system as shown on the plans.
- 9. **Gravel Sidewalk.** This item includes all excavation/ fill, grading, furnishing and placing base fabric, gravel compaction including watering if needed for the complete installation of gravel walk way as shown on plans.
- 10. **New Concrete Swale.** This item includes installation of the concrete swale that adjoins the stem wall and the portion that ties into the existing manhole. This pay item includes all excavation, grading, concrete, concrete placement, finishing to grade as shown and curing. This also includes any asphalt patching required to complete this item as shown on the plans.
- 11. **New Metal Stairs, Rails and Pads.** This item includes the furnishing, fabrication and installation of the complete stair system. It also includes all installation hardware and the pads required to anchor this stair system.
- 12. **Site Reclamation.** This item includes all work needed to remove the existing rock and fabric, re-grade and reseed the area as shown on the plans. It also includes adding

topsoil and reseeding the backfill area behind the newly constructed walls and terraces as well as any area disturbed during construction.

1.6 DEFECT ASSESSMENT

- A. Replace the Work, or portions of the Work, not conforming to specified requirements.
- B. If, in the opinion of the Engineer it is not practical to remove and replace the Work, the Engineer will direct one of the following remedies:
 - 1. The defective Work will be repaired to the instructions of the Montana Department of Fish, Wildlife and Parks Engineer and the unit sum/price will be adjusted to a new sum/price at the discretion of the Montana Department of Fish, Wildlife and Parks Project Engineer.
 - 2. The defective work will not be repaired. The Project Engineer will adjust the unit sum/price of the work to reflect the degree of defectiveness and subsequent serviceability.
- C. The individual specification sections may modify these options or may identify a specific formula or percentage sum/price reduction.
- D. The authority of the Montana Department of Fish, Wildlife and Park Project Engineer to assess the defect and identify payment adjustment, is final.

1.7 NON-PAYMENT FOR REJECTED PRODUCTS

- A. Payment will not be made for any of the following:
 - 1. Products wasted or disposed of in a manner that is not acceptable.
 - 2. Products determined as unacceptable before or after placement.
 - 3. Products not completely unloaded from the transporting vehicle.
 - 4. Products placed beyond the lines and levels of the required Work.
 - 5. Products remaining on hand after completion of the Work.
 - 6. Loading, hauling and disposing of rejected Products.

END SECTION

UTILITIES WITHIN WORK AREAS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Utilities within work areas.
- B. Contractor's responsibilities.

1.2 UTILITIES WITHIN WORK AREAS

- A. The contractor shall be responsible for determining the location of any utilities in the project area.
- B. The contractor shall be responsible for working safely around any utilities that are located within the project area.

1.3 CONTRACTOR RESPONSIBILITIES

- A. Notification: The Contractor shall contact, One Call Locators, prior to any excavation
 - 1. The nature of the work the Contractor will be performing.
 - 2. The time, date, and location the Contractor will be performing work that may conflict with the utility.
 - 3. The nature of work the utility will be required to perform such as moving a power pole, supporting a pole or underground cable, etc.
 - 4. Requests for field location and identification of utilities.
- B. <u>Overhead Utilities:</u> The Contractor shall use extreme caution to avoid a conflict, contact, or damage to overhead utilities such as power lines, telephone lines, television lines, poles, or other appurtenances during the course of construction of this project.

END OF SECTION

Section 01029 - 1 Page

COORDINATION AND MEETINGS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Coordination.
- B. Alteration project procedures.
- C. Preconstruction conference.

1.2 COORDINATION

- A. Coordinate scheduling, submittals, and Work of the various Sections of specifications to assure efficient and orderly sequence of installation of interdependent construction elements, with provisions for accommodating items installed later.
- B. Coordinate completion and clean up of Work of separate Sections in preparation for Substantial Completion.
- C. After Owner occupancy of site, coordinate access to site for correction of defective Work and Work not in accordance with Contract Documents, to minimize disruption of Owner's activities.
- D. Contractor will coordinate all work activities with the Montana Department of Fish, Wildlife and Parks Engineer Kenneth Phillips. P.E.

1.3 PRECONSTRUCTION CONFERENCE

- A. Engineer will schedule a conference after Notice of Award is issued.
- B. Attendance Required: Engineer, Contractor, Sub-Contractors and the Regional Fish, Wildlife and Parks representative when possible.

C. Agenda:

- 1. Execution of Owner-Contractor Agreement.
- 2. Submission of executed bonds and insurance certificates.
- 3. Distribution of Contract Documents.
- 4. Submission of list of Subcontractors, list of products, Schedule of Values, and progress schedule.
- 5. Designation of personnel representing the parties in Contract, and the Engineer.
- 6. Procedures and processing of field decisions, submittals, substitutions, applications for payments, proposal request, Change Orders and Contract closeout procedures.
- 7. Scheduling.

END OF SECTION

Section 01039 - 1 Page

QUALITY CONTROL

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Quality assurance and control of installation.
- B. References

1.2 QUALITY ASSURANCE/CONTROL OF INSTALLATION

- A. Monitor quality control over suppliers, manufacturers, products, services, site conditions, and workmanship, to produce work of specified quality.
- B. Comply fully with manufacturers' instructions, including each step in sequence.
- C. Should manufacturers' instructions conflict with Contract Documents, request clarification from Architect/Engineer before proceeding?
- D. Comply with specified standards as a minimum quality for the Work except when more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.
- E. Perform work by persons qualified to produce workmanship of specified quality.
- F. Secure Products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion or disfigurement.

1.3 REFERENCES

- A. Montana Public Works Standard Specifications Current edition.
- B. Should specified reference standards conflict with Contract Documents, or Regulations request clarification for Architect/Engineer before proceeding.
- C. The contractual relationship of the parties to the Contract shall not be altered from the Contract Documents by mention or inference otherwise in any reference document.

END OF SECTION

Section 01400 - 1 Page

TEMPORARY CONTROLS

PART 1 GENERAL

- 1.1 SECTION INCLUDES
 - A. Pollution Control
 - B. Traffic Control
- 1.2 RELATED SECTIONS
 - A. Section 01010 Summary of Work
 - B. Section 01039 Coordination and Meetings

1.7 POLLUTION CONTROL

A. Provide methods, means, and facilities to prevent contamination of soil, water, and atmosphere from discharge of noxious, toxic substances, and pollutants produced by construction operations.

1.8 TRAFFIC CONTROL

A. Provide all temporary signing, personnel and traffic control devises as required by federal, state and local regulations.

MATERIAL AND EQUIPMENT

PART I GENERAL

1.1 SECTION INCLUDES

- A. Products.
- B. Transportation and handling.
- C. Storage and protection.
- D. Substitutions.

1.2 PRODUCTS

- A. Products: Means new material, components, and systems forming the Work. Does not include machinery and equipment used for preparation, fabrication, conveying and erection of the Work. Products may also include existing materials or components required for reuse.
- B. Do not use materials and equipment removed from existing premises, except as specifically permitted by the Contract Documents.

1.3 TRANSPORTATION AND HANDLING

- A. Transport and handle products in accordance with manufacturer's instructions.
- B. Promptly inspect shipments to assure that products comply with requirements, quantities are correct, and products are undamaged.
- C. Provide equipment and personnel to handle products by methods to prevent soiling, disfigurement, or damage.

1.4 STORAGE AND PROTECTION

- A. Store and protect products in accordance with manufacturer's instructions, with seals and labels intact and legible. Store sensitive products in weather-tight, climate controlled enclosures.
- B. For exterior storage of fabricated products, place on sloped supports, above ground.
- C. Cover products subject to deterioration with impervious sheet covering. Provide ventilation to avoid condensation.
- D. Provide equipment and personnel to store products by methods to prevent soiling, disfigurement, or damage.

Section 01600 – 2 Pages

1.5 SUBSTITUTIONS

- A. Engineer will consider requests for Substitutions only within 15 days after date established in Notice to Proceed.
- B. Substitutions may be considered when a product becomes unavailable through no fault of the Contractor.
- C. Document each request with complete data substantiating compliance of proposed Substitution with Contract Documents.
- D. A request constitutes a representation that the Contractor:
 - 1. Has investigated proposed product and determined that it meets or exceeds the quality level of the specified product.
 - 2. Will provide the same warranty for the Substitution as for the specified product.
 - 3. Will coordinate installation and make changes to other Work which may be required for the Work to be complete with no additional cost to Owner.
 - 4. Waives claims for additional costs or time extension which may subsequently become apparent.
- E. Substitutions will not be considered when they are indicated or implied on shop drawing or product data submittals, without separate written request, or when acceptance will require revision to the Contract Documents.
- F. Substitution Submittal Procedure:
 - 1. Submit three copies of request for Substitution for consideration. Limit each request to one proposed Substitution.
 - 2. Submit shop drawings, product data, and certified test results attesting to the proposed product equivalence.
 - 3. The Engineer will notify Contractor, in writing, of decision to accept or reject request.

CONTRACT CLOSEOUT

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Closeout procedures.
- B. Final cleaning.
- C. Adjusting.
- D. Project record documents.

1.2 CLOSEOUT PROCEDURES

- A. Notify the Engineer within 5 days of Work completion that Work is complete in accordance with Contract Documents and ready for Project Manager's final inspection.
- B. Provide submittals to Engineer that are required by governing or other authorities or Owner.
- C. Submit final Application for Payment identifying total adjusted Contract Sum, previous payments, and sum remaining due. Include Certificate of Substantial Completion, Affidavit on Behalf of the Contractor, Consent of Surety Company to Final Payment and As-built drawings and specifications.
- D. Owner will occupy all portions of the site.

1.3 FINAL CLEANING

- A. Execute final cleaning prior to final inspection.
- B. Clean equipment and fixtures to a sanitary condition.
- C. Clean site, rake clean landscaped areas, leave all disturbed areas relatively smooth with no wheel tracks, ridges or ruts.

1.4 PROJECT RECORD DOCUMENTS

- A. Maintain on site, one set of the following record documents; record actual revisions to the Work:
 - 1. Contract Drawings.
 - 2. Specifications.

- 3. Addenda.
- 4. Change Orders and other Modifications to the Contract.
- 5. Reviewed shop drawings, product data, and samples.
- B. Store Record Documents separate from documents used for construction.
- C. Record information concurrent with construction progress.
- D. Specifications: Legibly mark and record at each Product section description of actual Products installed, including the following:
 - 1. Manufacturer's name and product model and number.
 - 2. Product substitutions or alternates utilized.
 - 3. Changes made by Addenda and Modifications.
- E. Record Documents and Shop Drawings: Legibly mark each item to record actual construction including:
 - 1. Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.
 - 2. Field changes of dimension and detail.
 - 3. Details not on original Contract drawings.
 - 4. Product substitutions or alternates utilized.
 - 5. Changes made by Addenda and Modifications.
- F. Submit documents to Engineer with claim for final Application for Payment.

1.5 WARRANTIES

A. All work shall be warranted free from defect for a period of 10 years from final inspection date.

END OF SECTION

Section 01700 – 2 Pages

REMOVAL OF EXISTING PAVEMENT, CONCRETE CURB, SIDEWALK, DRIVEWAY AND/OR STRUCTRUES

REFERENCE IS MADE TO THE MONTANA PUBLIC WORKS STANDARD SPECIFICATIONS WITH THE FOLLOWING CHANGES/CLARIFICATIONS.

PART 1: GENERAL

1.1 DESCRIPTION

A. The work consists of removing and disposing of existing pavement, treated wooden timbers as well as the pin down staking for the treated timbers.

Part 3: EXECUTION

3.1 GENERAL

- A. Dispose of all existing pavement, treated timbers and associated hardware specified for removal. Exercise care in such removal to assure that the remaining nearby facilities and/ or structures are not disturbed. Restore to original condition any such existing facilities or structures damaged by construction activities.
- B. Cut, remove and dispose of designated existing pavement to the lines indicated on the contract documents, or directed by the Engineer. Make straight and approximately vertical cuts of edges along which new concrete curbs are to be placed.

PART 4: MEASUREMENT AND PAYMENT

4.1 GENERAL

A. Payment for this section is per section 01025 Measurement and Payment.

STREET EXCAVATION, BACKFILL AND COMPACTION

REFERENCE IS MADE TO THE MONTANA PUBLIC WORKS STANDARD SPECIFICATIONS WITH THE FOLLOWING CHANGES/CLARIFICATIONS.

PART 1: GENERAL

- 1.3 DENSITY CONTROL TESTING
 - C. Material Submittals

PART 3: EXECUTION

- 3.1 EXECUTION
 - B. Stockpile the respective road mix, topsoil, and general fill material in separate stockpiles for later re-use. Avoid mixing the material as little as possible.

PART 4: MEASUREMENT AND PAYMENT

- A. EXCAVATION ABOVE SUBGRADE
 - 4. Payment is lump sum.
- B. SUBEXCAVATION/REPLACEMENT BELOW SUBGRADE
 - 2. Payment is lump sum.
- C. EMBANKMENT IN PLACE
 - 3. Payment is per Section 01025 Measurement and Payment.

CONCRETE FORMWORK

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Formwork for cast-in place concrete, with shoring, bracing and anchorage.
- B. Form accessories.
- C. Form stripping.

1.2 PRODUCTS INSTALLED BUT NOT FURNISHED UNDER THIS SECTION

A. Section 03300 - Cast-In-Place Concrete: Supply of concrete accessories for placement by this section.

1.3 RELATED SECTIONS

- A. Section 03200 Concrete Reinforcement.
- B. Section 03300 Cast-in-Place Concrete.

1.4 REFERENCES

- A. ACI 301 Structural Concrete for Buildings.
- B. ACI 318 Building Code Requirements for Reinforced Concrete.
- C. ACI 347 Recommended Practice For Concrete Formwork.
- D. PS 1 Construction and Industrial Plywood.

1.5 DESIGN REQUIREMENTS

A. Construct formwork, shoring and bracing to conform to design and code requirements; resultant concrete to conform to required shape, line and dimension.

1.6 REGULATORY REQUIREMENTS

Conform to applicable code for fabrication, erection and removal of formwork.

PART 2 PRODUCTS

2.1 WOOD FORM MATERIALS

A. Form Materials: At the discretion of the Contractor.

2.2 FORMWORK ACCESSORIES

- A. Form Release Agent: Colorless mineral oil which will not stain concrete, or absorb moisture
- B. Nails, Spikes, Lag Bolts, Through Bolts, Anchorages: Sized as required, of sufficient strength and character to maintain formwork in place while placing concrete.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify lines, levels and centers before proceeding with formwork. Ensure that dimensions agree with drawings.

3.2 EARTH FORMS

A. Earth forms are not permitted unless provided for in project plan.

3.3 ERECTION - FORMWORK

- A. Erect formwork, shoring and bracing to achieve design requirements, in accordance with requirements of ACI 301.
- B. Provide bracing to ensure stability of formwork. Shore or strengthen formwork subject to over stressing by construction loads.
- C. Arrange and assemble formwork to permit dismantling and stripping. Do not damage concrete during stripping.
- D. Align joints and make watertight. Keep form joints to a minimum.

3.4 APPLICATION - FORM RELEASE AGENT

- A. Apply form release agent on formwork in accordance with manufacturer's recommendations
- B. Apply prior to placement of reinforcing steel, anchoring devices, and embedded items.

C. Soak inside surfaces of untreated forms with clean water. Keep surfaces coated with form release agent prior to placement of concrete.

3.5 FORMWORK TOLERANCES

A. Construct formwork to maintain tolerances required by Section 03300 - Cast-in-Place Concrete.

3.4 FIELD QUALITY CONTROL

- A. Inspect erected formwork, shoring, and bracing to ensure that work is in accordance with design, and that supports, fastenings, wedges, ties, and items are secure.
- B. Notify Engineer <u>72</u> hours prior to concrete placement for inspection of formwork and rebar reinforcement installation.

3.5 FORM REMOVAL

- A. Do not remove forms or bracing until concrete has gained sufficient strength to carry its own weight and imposed loads.
- B. Loosen forms carefully. Do not wedge pry bars, hammers, or tools against finish concrete surfaces scheduled for exposure to view.

CONCRETE REINFORCEMENT

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Reinforcing steel, fibermesh and accessories for cast-in-place concrete.

1.2 RELATED SECTIONS

- A. Section 03100 Concrete Formwork.
- B. Section 03300 Cast-in-Place Concrete.

1.3 REFERENCES

- A. CRSI Concrete Reinforcing Steel Institute Manual of Practice.
- B. CRSI 63 Recommended Practice For Placing Reinforcing Bars.
- C. CRSI 65 Recommended Practice For Placing Bar Supports, Specifications and Nomenclature.

1.4 QUALITY ASSURANCE

A. Perform Work in accordance with CRSI 63, 65 and Manual of Practice.

1.5 COORDINATION

A. Coordinate work under provisions of Section 01039.

PART 2 PRODUCTS

2.1 REINFORCEMENT

- A. Reinforcing Steel: ASTM A 615 or ASTM A 617/A 617M, Grade 40. Place as shown on the plans.
- B. Fibermesh micromesh reinforcement: Fibrillate polypropylene olefin fibermesh or approved equal.

2.2 ACCESSORY MATERIALS

- A. Tie Wire: Minimum 16 gage annealed type.
- B. Saddles: Use actual saddles intended for reinforcement bars not blocks, rocks or other non fabricated items

2.3 FABRICATION

- A. Fabricate concrete reinforcing in accordance with CRSI Manual of Practice.
- B. Locate reinforcing splices not indicated on drawings, at point of minimum stress, according to ACI 301. Review location of splices with Engineer.

PART 3 EXECUTION

3.1 PLACEMENT

- A. Place, support and secure reinforcement against displacement. Do not deviate from required position.
- B. Maintain concrete cover around reinforcing as follows:

<u>Item</u>	Coverage
Footings and Concrete Formed	2 inches
Against Earth	3 inches

3.2 FIELD QUALITY CONTROL

- A. Field inspection shall be performed by the Engineer.
- B. Notify Engineer <u>72</u> hours prior to placement of concrete inform for form work and rebar inspection.

SECTION 03300 CAST-IN-PLACE CONCRETE

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Control, expansion and contraction joint devices associated with concrete work.

1.2 RELATED SECTIONS

- A. Section 03100 Concrete Formwork: Formwork and accessories.
- B. Section 03200 Concrete Reinforcement: Reinforcement

1.3 MEASUREMENT AND PAYMENT

- A. Concrete:
- 1. Basis of Measurement: Per Work Item.
- 2. Basis of Payment: Payment includes grading, formwork, fiber and steel reinforcement, concrete, placement accessories, consolidating and leveling, troweling, finishing, curing, drain rock and filter fabric. See section 01025 Measurement and Payment.

1.4 REFERENCES

- A ACI 304 Recommended Practice for Measuring, Mixing, Transporting and Placing Concrete.
- B. ACI 305R Hot Weather Concreting.
- C. ACI 306R Cold Weather Concreting.
- D. ACI 308 Standard Practice for Curing Concrete.
- E. ANSI/ASTM D1751 Preformed Expansion Joint Fillers for Concrete Paving and Structural Construction (Non-extruding and Resilient Bituminous Types).
- F. ASTM C33 Concrete Aggregates.
- G. ASTM C94 Ready-Mixed Concrete.
- H. ASTM C150 Portland Cement.
- I. ASTM C260 Air Entraining Admixtures for Concrete.
- J ASTM C494 Chemicals Admixtures for Concrete.

1.5 QUALITY ASSURANCE

A. Perform Work in accordance with ACI 301.

PART 2 PRODUCTS

2.1 CONCRETE MATERIALS

- A. Cement: ASTM C150, Type IA or II Air Entraining Portland type.
- B. Fine and Coarse Aggregates: ASTM C33.
- C. Water: Clean and not detrimental to concrete. Per ASTM C94

2.2 ADMIXTURES

A. Air Entrainment: ASTM C260.

2.4 CONCRETE MIX

- A. Mix and deliver concrete in accordance with ASTM C94, Alternative No. 3.
- B. Select proportions for normal weight concrete in accordance with ACI 301 Method 3.
- C. Provide concrete to the following criteria:

<u>Unit</u>	Measurement
Concrete Classification	M-4000
Aggregate Size (maximum)	3/4 inch
Air Entrained	3 - 6 percent
Slump (maximum)	3 - 4 inches

- D. Use accelerating admixtures in cold weather only when approved by Engineer. Use of admixtures will not relax cold weather placement requirements.
- E. Use set retarding admixtures during hot weather only when approved by Engineer.
- F. Add air entraining agent to normal weight concrete mix for work exposed to exterior.
- G. Use of calcium chloride as an admixture is prohibited!

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify that reinforcement and other items to be cast into concrete are accurately placed, positioned securely.
- B. Verify requirements for concrete cover over reinforcement.

3.2 PREPARATION

A. Prepare previously placed concrete by cleaning with steel brush and applying bonding agent in accordance with manufacturer's instructions.

3.3 PLACING CONCRETE

- A. Place concrete in accordance with ACI 301.
- B. Notify Engineer minimum 72 hours prior to commencement of operations. The forms and steel reinforcement shall be inspected by the Engineer before concrete may be placed.
- C. Ensure reinforcement, embedded parts, formed expansion and contraction joints, are not disturbed during concrete placement.
- D. Maintain records of concrete placement. Record date, location, quantity, air temperature, and test samples taken.
- E. The contractor shall not allow cold joints to occur within continuous sections of concrete.

F. Tolerance:

- 1. Horizontal alignments on all work shall be such that the concrete serves the function intended and presents a clean, even, regular appearance. Lines intended to be straight shall be within a tolerance of plus or minus 2 inches in 100 feet.
- 2. Elevation shall be plus or minus .05 feet of staked elevation.

3.5 CURING AND PROTECTION

- A. Immediately after placement, protect concrete from premature drying, excessively hot or cold temperatures, and mechanical injury.
- B. Maintain concrete with minimal moisture loss at relatively constant temperature for period necessary for hydration of cement and hardening of concrete.
- C. Concrete placed during cold weather shall be protected in accordance with ACI 306R Cold Weather Concreting.

3.6 FIELD QUALITY CONTROL

- A. Field inspection and testing will be performed by the Engineer.
- B. Contact engineer 72 hours prior to placement of concrete in forms.
- C. Provide free access to Work and cooperate with testing firm.
- D. Submit proposed mix design of concrete to the Engineer for review 72 hours prior to commencement of Work.
- E. Tests of cement and aggregates may be performed at the Engineers direction to ensure conformance with specified requirements.

3.7 PATCHING

- A. Allow Engineer to inspect concrete surfaces immediately upon removal of forms.
- B. Excessive honeycomb or embedded debris in concrete is not acceptable. Notify Engineer upon discovery.
- C. Patch imperfections as directed.

3.8 DEFECTIVE CONCRETE

- A. Defective Concrete: Concrete not conforming to required lines, details, dimensions, tolerances or specified requirements.
- B. The repair or replacement of defective concrete will be determined by the Engineer.
- C. Do not patch, fill, touch-up, repair, or replace exposed concrete except upon express direction of Engineer for each individual area.

SECTION 03500 SEGMENTAL RETAINING WALL

SECTION 1

PART 1: GENERAL

1.1 Scope

Work includes installing owner furnished modular concrete block retaining wall units to the lines and grades designated on the construction drawings and as specified herein.

1.2 Sections of Related Work

Section 03510: Water Management

1.3 Reference Standards – Unless over wise noted most recent standard should be used ASTM C1372 Standard Specification for Segmental Retaining Wall Units.

ASTM 1262 Evaluating the Freeze thaw Durability of Manufactured CMU's and Related concrete Units

ASTM D698 Moisture Density Relationship for Soils, Standard Method

ASTM D422 Gradation of Soils

ASTM C140 Sample and Testing concrete Masonry Units

- 1.4 Delivery, Storage, and Handling
 - A. Contractor shall check the materials upon delivery to assure proper material has been received.
 - B. Contractor shall prevent excessive mud, wet cement, and like construction debris from coming in contact with the materials.
 Contractor shall protect the materials from damage. Damaged material shall not

be incorporated in the project (ASTM C1372).

PART 2: MATERIALS

2.1 Modular Wall Units

- A. Wall units provided by the owner are Allan Block Retaining Wall units AB Classic, as produced by a licensed manufacturer or approved equal.
- B. Wall units shall have minimum 28 day compressive strength of 3000 psi in accordance with ASTM C1372. The concrete units shall have adequate freeze-thaw protection in accordance with ASTM C1372 or an average absorption rate of 7.5 lb/ft³ for northern climates.
- C. Exterior dimensions shall be uniform and consistent. Maximum dimensional deviations on the height of any two units shall be 0.125 in..
- D. Wall units shall provide a minimum of 110 lbs total weight per square foot of wall face area. Fill contained within the units may be considered 80% effective weight.
- E. Exterior face shall be textured. Color: concrete gray.

2.2 Wall Rock

- A. Material must be well-graded compactable aggregate, 0.25 in. to 1.5 in., with no more than 10% passing the #200 sieve. (ASTM D422)
- B. Material behind and within the blocks may be the same material.

2.3 Infill Soil

A. Infill material shall be existing site soils. Where additional fill is required, contractor shall notify the FWP engineer for approval.

PART 3: WALL CONSTRUCTION

3.1 Excavation

- A. Contractor shall excavate to the lines and grades shown on the construction drawings. Contractor shall use caution not to over-excavate beyond the lines shown, or to disturb the base elevations beyond those shown.
- B. Contractor shall verify locations of existing structures and utilities prior to excavation. Contractor shall ensure all surrounding structures are protected from the effects of wall excavation.

3.2 Foundation Soil Preparation

- A. Foundation soil shall be defined as any soils located beneath a wall.
- B. Foundation soil shall be excavated as dimensioned on the plans and compacted to a minimum of 95% of Standard Proctor (ASTM D698) prior to placement of the base material.
- C. Foundation soil shall be examined by the on-site soils engineer to ensure that the actual foundation soil strength meets or exceeds assumed design strength. Soil not meeting the required strength shall be removed and replaced with acceptable material at the expense of the owner.

3.3 Base

- A. <u>Base material shall be placed as shown on the construction drawing.</u> Top of base shall be located to allow bottom wall units to be buried to proper depths as per wall heights and specifications.
- B. Base material shall be installed on undisturbed native soils or suitable replacement fills compacted to a minimum of 95% Standard Proctor (ASTM D698).
- C. Base shall be compacted at 95% Standard Proctor (ASTM D698) to provide a level hard surface on which to place the first course of blocks. The base shall be constructed to ensure proper wall embedment and the final elevation shown on the plans. Well-graded sand can be used to smooth the top 1/2 in. on the base material.
- D. Base material shall be a 4 in. minimum depth for walls under 4 ft and a 6 in. minimum depth for walls over 4 ft. See typical sections on the plan sheets.

3.4 Unit Installation

A. The first course of wall units shall be placed on the prepared base with the raised lip facing up and out and the front edges tight together. The units shall be checked

- for level and alignment as they are placed.
- B. Ensure that units are in full contact with base. Proper care shall be taken to develop straight lines and smooth curves on base course as per wall layout.
- C. Fill all cores and cavities and a minimum of 12 in. behind the base course with wall rock. Use approved soils to backfill behind the wall rock and in front of the base course to firmly lock in place. Check again for level and alignment. Use a plate compactor to consolidate the area behind the base course. All excess material shall be swept from top of units.
- D. Install next course of wall units on top of base row. Position blocks to be offset from seams of blocks below. Check each block for proper alignment and level. Fill all cavities in and around wall units and to a minimum of 12 in. depth behind block with wall rock. Spread backfill in uniform lifts not exceeding 8 in. in uncompacted thickness and compact to 95% of Standard Proctor (ASTM D698) behind the consolidation zone.
- E. The consolidation zone shall be defined as 3 ft behind the wall. Compaction within the consolidation zone shall be accomplished by using a hand operated plate compactor and shall begin by running the plate compactor directly on the block and then compacting in parallel paths from the wall face until the entire consolidation zone has been compacted. A minimum of two passes of the plate compactor are required with maximum lifts of 8 in. Expansive or fine-grained soils may require additional compaction passes and/or specific compaction equipment such as a sheepsfoot roller. Maximum lifts of 4 inches may be required to achieve adequate compaction within the consolidation zone. Employ methods using lightweight compaction equipment that will not disrupt the stability or batter of the wall.
- F. Install each subsequent course in like manner. Repeat procedure to the extent of wall height.
- G. The following recommended minimum tolerances can be achieved with good construction techniques.

Vertical Control - ± 1.25 in. max. over 10 ft distance.

Horizontal Location Control - straight lines ± 1.25 in. over a 10 ft distance.

Rotation - from established plan wall batter: 2.0°

Bulging - 1.0 in. over a 10 ft distance

3.5 Additional Construction Notes

A. Water management is of extreme concern during and after construction. Steps must be taken to ensure that drain pipes are properly installed and a grading plan has been developed that routes water away from the retaining wall location. Site water management is required both during construction of the wall and after completion of construction.

SECTION 03510 WATER MANAGEMENT

PART 1: GENERAL DRAINAGE

1.1 Surface Drainage

Rainfall or other water sources such as irrigation activities collected by the ground surface atop the retaining wall can be defined as surface water. Retaining wall design shall take into consideration the management of this water.

- A. At the end of each day's construction and at final completion, grade the backfill to avoid water accumulation behind the wall or in the reinforced zone.
- B. Surface water must not be allowed to pond or be trapped in the area above the wall or at the toe of the wall.
- C. Existing slopes adjacent to retaining wall or slopes created during the grading process shall include drainage details so that surface water will not be allowed to drain over the top of the slope face and/or wall. This may require a combination of berms and surface drainage ditches.
- D. Surface water that cannot be diverted from the wall must be collected with surface drainage swales and drained laterally in order to disperse the water around the wall structure.

1.2 Grading

The shaping and recontouring of land in order to prepare it for site development is grading. Site grading shall be designed to route water around the walls.

- A. Establish final grade with a positive gradient away from the wall structure where possible..
- B. Grading designs must divert sources of concentrated surface flow, such as parking lots, away from the wall.

1.3 Drainage System

The internal drainage systems of the retaining wall can be described as the means of eliminating the buildup of incidental water which infiltrates the soils behind the wall.

A. All walls will be constructed with a minimum of 12 in. of wall rock directly behind the wall facing. The material shall meet or exceed the specification for wall rock outlined in Section 03500, 2.2 Wall Rock.

GEOGRID REINFORCEMENT

PART 1: GENERAL

1.1 Scope

Work includes furnishings and installing geogrid reinforcement, wall fill, and backfill to the lines and grades designated on the construction drawings and as specified herein.

1.2 Applicable Section of Related Work

Section 03500: Segmental Retaining Wall

Section 03510: Water Management.

1.3 Reference Standards

Additional Standards:

- A. ASTM D4595 Tensile Properties of Geotextiles by the Wide-Width Strip Method
- B. ASTM D5262 Test Method for Evaluating the Unconfined Creep Behavior of Geogrids
- C. ASTM D6638 Grid Connection Strength (SRW-U1)
- D. ASTM D6916 Grid Shear Strength (SRW-U2)
- E. GRI-GG4 Grid Long Term Allowable Design Strength (LTDS)
- F. ASTM D6706 Test Method for Grid Pullout

1.4 Delivery, Storage, and Handling

- A Contractor shall check the geogrid upon delivery to assure that the proper material has been received.
- B. Geogrid shall be stored above -10 F (-23 C).
- C. Contractor shall prevent excessive mud, wet cement, or other foreign materials from coming in contact with the geogrid material.

PART 2: MATERIALS

2.1 Definitions

- A. Geogrid products shall be of high density polyethylene or polyester yarns encapsulated in a protective coating specifically fabricated for use as a soil reinforcement material.
- B. Concrete retaining wall units are as detailed on the drawings and shall be provided by owner.
- C. Drainage material is free draining granular material as defined in Section 3500, 2.2 Wall Rock.
- D. Backfill is the soil used as fill for the reinforced soil mass.
- E. Foundation soil is the in-situ soil.

2.3 Manufacturers – Tensar Products or Equal

PART 3: WALL CONSTRUCTION

- 3.1 Foundation Soil Preparation
 - A. Foundation soil shall be excavated to the lines and grades as shown on the construction drawings, or as directed by the on-site soils engineer.
 - B. Foundation soil shall be examined by the on-site soils engineer to assure that the actual foundation soil strength meets or exceeds assumed design strength.
 - C. Over-excavated areas shall be filled with compacted backfill material approved by

- on-site soils engineer.
- D. Contractor shall verify locations of existing structures and utilities prior to excavation. Contractor shall ensure all surrounding structures are protected from the effects of wall excavation.

3.2 Wall Construction

Wall construction shall be as specified under Section 03500, Part 3, Wall Construction.

3.3 Geogrid Installation

- A. Install block wall to designated height of first geogrid layer. Backfill and compact in layers not to exceed 8 in. lifts behind wall to depth equal to designed grid length before grid is installed.
- B. Cut geogrid to designed embedment length and place on top of block to back edge of lip. Extend away from wall approximately 3% above horizontal on compacted backfill.
- C. Lay geogrid at the proper elevation and orientations shown on the construction drawings or as directed by the FWP engineer.
- D. Correct orientation of the geogrid shall be verified by the contractor. Strength direction is typically perpendicular to wall face.
- E. Follow manufacturers guidelines for overlap requirements.
- F. Place next course of block on top of grid and fill block cores with wall rock to lock in place. Remove slack and folds in grid and stake to hold in place.
- G. Adjacent sheets of geogrid shall be butted against each other at the wall face to achieve 100 percent coverage.
- H. Geogrid lengths shall be continuous. Splicing parallel to the wall face is not allowed

3.4 Fill Placement and Backfill Placement

- A. Infill material shall be placed in lifts and compacted as specified under Section 03500, Part 3.4, Unit Installation.
- B. Backfill shall be placed, spread and compacted in such a manner that minimizes the development of slack or movement of the geogrid.
- C. Only hand-operated compaction equipment shall be allowed within 3 ft behind the wall. This area shall be defined as the consolidation zone. Compaction in this zone shall begin by running the plate compactor directly on the block and then compacting in parallel paths to the wall face until the entire consolidation zone has been compacted. A minimum of two passes of the plate compactor are required with maximum lifts of 8 in.
- D. When fill is placed and compaction cannot be defined in terms of Standard Proctor Density, then compaction shall be performed using ordinary compaction process and compacted so that no deformation is observed from the compaction equipment or to the satisfaction of the FWP.
- E. Tracked construction equipment shall not be operated directly on the geogrid. A minimum backfill thickness of 6 in. is required prior to operation of tracked vehicles over the geogrid. Turning of tracked vehicles should be kept to a minimum to prevent tracks from displacing the fill and damaging the geogrid.
- F. Rubber-tired equipment may pass over the geogrid reinforcement at slow speeds, less than 10 mph. Sudden braking and sharp turning shall be avoided.

G. The infill shall be compacted to achieve 95% Standard Proctor (ASTM D698). Compaction tests shall be taken at 3 ft behind the block and at the back of the reinforced zone and frequency shall be as determined by the FWP engineer as necessary. The contractor is responsible for achieving the specified compaction requirements.

METAL FABRICATIONS

1.1 GENERAL

- A. Submittals: In addition to Product Data, submit the following:
 - 1. Shop Drawings detailing fabrication and erection.
 - 2. Templates for anchor bolts.

1.2 PRODUCTS

- A. General: Provide materials with smooth, flat surfaces without blemishes.
- B. Ferrous Metals: As follows:
 - 1. Steel Plates, Shapes and Bars: ASTM A 36/A 36M
 - 2. Steel Tubing: Cold-formed steel tubing complying with ASTM A 500
 - 3. Steel Pipe: ASTM A 53, standard weight (Schedule 40), unless otherwise indicated.
 - 4. Concrete Inserts: Threaded or wedge type; galvanized ferrous castings, either ASMT A 47 (ASMT A 47M) malleable iron or ASMT A 27/A 27M cast steel. Provide bolts, washers and shims as needed, hot-dip galvanized per ASTM A 153/A 153M.
- D. Fasteners: Provide Type 304 or 316 stainless-steel fasteners for exterior use and zinc-plated fasteners with coating complying with ASTM B 633, Class Fe/Zn 5, where built into exterior walls. Select fasteners for type, grade and class required.
- E. Fabrication, General: Use connections that maintain structural value of joined pieces. Shear and punch metals cleanly and accurately. Remove burrs.
 - 5. Weld corners and seams continuously. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals. Obtain fusion without undercut or overlap. Remove welding flux immediately. Finish exposed welds smooth and blended.
 - 6. Fabricate joints that will be exposed to weather in a manner to exclude water, or provide weep holes.
 - 7. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners where possible. Locate joints where least conspicuous.
- F. Loose Bearing and Leveling Plates: Provide for steel items bearing on masonry or concrete. Drill plates to receive anchor bolts.
 - 1. Galvanize plates and angles.

- G. Metal prefabricated steps: Fabricate to sizes indicated and for attachment to framing. Provide horizontally slotted holes to receive 5/8-inch bolts, spaced per the plans
 - 1. Metal prefabricated steps: Shall be McNichols_R Quality Bar Grating Stair Tread, Type B Standard, Galvanized, Checker Plate Nosing, GW 100 1"X3/16" Bearing Bars, Smooth Surface, 10.9375"X36.0000", or approved equal.
- H. Miscellaneous Framing and Supports: Provide steel framing and supports that are not a part of structural-steel framework as necessary to complete the Work. Fabricate from structural steel of welded construction. Cut, drill and tap units to receive hardware, hangers and similar items.
 - 1. Where indicated to be cast into concrete or built into masonry, equip with integrally welded anchors at 24 inches (600 mm) o.c.
- I. Miscellaneous Steel Trim: Fabricate units with continuously welded joints and smooth exposed edges. Miter corners and use concealed splices where possible. Provide cutouts, fittings and anchorages; coordinate assembly and installation with other work.
- J. Finish metal fabrications after assembly. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes. Shop prime ferrous-metal items not indicated to be galvanized.
 - 1. Hot-dip galvanize items indicated to be galvanized to comply with ASTM A 153 or ASTM 153M as applicable.
 - 2. Preparation for Shop Priming: Prepare uncoated ferrous-metal surfaces to comply with SSPC-SP 3, "Power Tool Cleaning."

1.3 EXECUTION

- A. Installation, General: Provide anchorage devices and fasteners for securing metal fabrications to in-place construction. Perform cutting, drilling and fitting required for installing metal fabrications. Set metal fabrications accurately in location, with edges and surfaces level, plumb and true.
 - 1. Provide temporary bracing or anchors in formwork for items that are to be built into concrete, masonry, or similar construction.
 - 2. Fit exposed connections accurately together. Weld connections, unless otherwise indicated. Do not weld or abrade galvanized surfaces.
- B. Set bearing and leveling plates on cleaned surfaces using wedges, shims, or

- leveling nuts. After bearing members have been positioned and plumbed, tighten anchor bolts and pack with nonshrink, nonmetallic grout.
- C. Galvanized Surfaces: Clean field welds, bolted connections and abraded areas and repair galvanizing to comply with ASTM A 780.